

Dzonot: a landrace sweet pepper variety

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Abstract

Sweet pepper (*Capsicum annuum* L.) is a non-spicy landrace chili used to flavor many regional dishes in the Yucatán Peninsula. It is poorly characterized and there are no improved varieties, so it is important to develop open-pollinated varieties with outstanding agronomic characteristics and make the seed available to local producers. Dzonot originated from the YAXCH accession collected in 2018 in Yaxchekú, Tizimín, Yucatán. This variety was formed using the mass selection breeding method. The homogeneity and yield work were carried out in a greenhouse with transplantation dates of October 4, 2019, July 27, 2021, and January 4, 2022. In the first trial, established at the best growing time, a yield of 40.8 t ha⁻¹ was obtained during a five month harvest period. In the second trial, the harvest was maintained for 4.5 months and produced 29.1 t ha⁻¹. In the third trial, production was 21.1 t ha⁻¹ in three months of harvest. The yield of the plots established before and after the best growing season accounted for 71% and 52% of the best yield. Dzonot has high yield potential for Yucatán, especially when established in October; it produces fruits that are a homogeneous in shape and in a stable manner. Its main characteristic is the flat shape of the fruit, wider than long, and deep interocular grooves.

Keywords:

Capsicum annuum L., vegetable, yield.



In the Yucatán Peninsula, sweet pepper (*Capsicum annuum* L.) is a non-spicy landrace chili that resembles a small bell pepper. It is used to season regional dishes and is preferably consumed green rather than red (Santamaría *et al.*, 2022b). They vary in shape and sometimes in flavor, which makes them important in the use of various local dishes (Pozo *et al.*, 1991; Chi-Kantún *et al.*, 2017). The shape of the fruit ranges from round to slightly elongated with flattened ends; it has well-defined locules; they are green in an immature state and change to red when ripe.

It can have a very flattened shape that makes it highly appreciated in the market (Basto-Pool and Hernández-Pinto, 2020). Preliminary studies of sweet pepper have been carried out for their characterization and evaluation; however, its diversity has been little exploited. The seed used for sowing depends on the farmers who grow and save seed in each cycle (Aguilar *et al.*, 2010). The traits of fruit length and diameter are important phenotypic characteristics for selecting cultivars with good quality because there is a preference for fruits that show shorter length but larger diameter (Ix-Nahuat *et al.*, 2013).

Like most of the landrace cultivars of *Capsicum annuum* in the Yucatán Peninsula, sweet pepper is poorly characterized and there are no improved varieties (González *et al.*, 2010), so it is necessary to generate open-pollinated varieties with outstanding agronomic characteristics and make the seed available to local producers.

Origin

Dzonot, previously reported as Dulce Costillón, has the definitive registration number CHL-063-220224 in the National Catalog of Plant Varieties; it comes from the YAXCH accession collected in 2018 in the locality of Yaxchekú in the municipality of Tizimín, Yucatán and introduced to the Germplasm Bank of Chilis of the Mococho Experimental Field. This variety was formed by the mass selection breeding method, which is based on the selection of individuals with similar phenotypic characteristics to mix them and thus constitute the next generation, a process that is repeated as many times as necessary until the population becomes homogeneous (Márquez, 1988; Ramírez and Méndez, 2018). In sweet pepper, Chi-Kantún *et al.* (2017) found a response to mass selection in agronomically important traits.

Characteristics

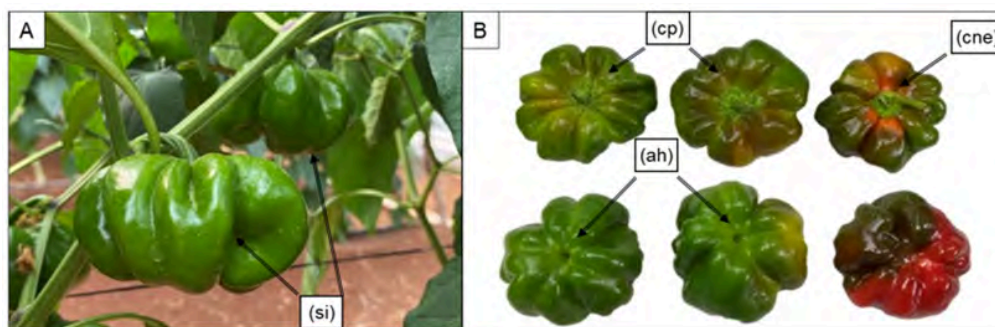
The yield and homogeneity evaluation work were carried out in a greenhouse; under these conditions, cross-pollination is reduced due to the absence of insects. The traits of the variety were evaluated based on the guidelines for the execution of the examination of distinctiveness, homogeneity and stability for *C. annuum* proposed by UPOV (2018); SNICS (2014).

Seedlings contain anthocyanins in the hypocotyl when they are in the cotyledonal leaf stage. The plant is tall (160 cm on average) and semi-erect. The stem is green, with strong anthocyanin pigmentation at the nodes and with absent or very weak hairiness. The leaves are oval in shape and medium green, the blade is long (19 cm on average) and wide (7.8 cm on average), the margin undulation is medium, the puffing is weak, and the cross-sectional profile is moderately convex.

They have 1 to 2 flowers per axil with a hanging peduncle, 5 to 6 white petals and others with anthocyanin pigmentation. The fruits do not contain anthocyanin pigmentation; they are green with medium intensity and strong brightness before ripeness; when ripe, they acquire a red tone with medium intensity and medium brightness. The fruits are flat in the longitudinal section, the apex is sunken, with a calyx of non-enveloping appearance, and the depth of the peduncular cavity is medium (Figure 1).



Figure 1. Fruits of the Dzonot sweet pepper variety. A) green fruits at commercial maturity. The fruits are flat in shape with greater width than length and deep interlocular grooves and B) green and mottled fruits. The peduncular cavity is of medium depth and the apex is sunk; sunken apex (ap), interlocular grooves (si), peduncular cavity (cp) and non-enveloping calyx (cne).



The fruit is hanging, the sinuosity of the pericarp is medium, the texture of the surface is smooth, the cross-sectional shape is angular, and there is no capsaicin. The fruits are of medium length (5.4 cm) and wide diameter (7.2 cm). The length of the fruit is similar but the width is greater than the materials reported by Pech *et al.* (2010).

The interlocular grooves are deep, 3 to 5 locules. The thickness of the pericarp is 3.5 mm and the length of the peduncle is 2.5 cm. The seeds are cream-colored and circular. The seeds of green fruits have a weight of 1 000 seeds of 3.2 g, 4.13 mm long and 3.65 mm wide; in ripe fruits, the weight of 1 000 seeds is 7.2 g, 4.37 mm long, and 3.8 mm wide.

The first trial was established on October 4, 2019, at the best time for vegetable growing, and was compared with the P32 heart-shaped fruit and triangular fruit P107 accessions (Santamaría *et al.*, 2022a); the second trial was established on July 27, 2021; the third trial was established on January 4, 2022. In the first trial, Dzonot produced 40.8 t ha⁻¹ over a five month harvest period. Most of the fruits were classified as large (Table 1).

Table 1. Production of fresh fruit from three accessions of landrace sweet pepper grown in a greenhouse in Mocochoá, Yucatan. 2019-2020.

Material	Yield (t ha ⁻¹)	Small fruits (%)	Medium fruits (%)	Large fruits (%)
Dzonot	40.822 a	30.1	32.3	37.6
P32	28.545 b	20.1	31.7	48.2
P107	23.685 b	29.4	34.6	36

Means with the same literal in columns are statistically equal (Tukey, $p=0.05$).

The classification was made by size, based on diameter, according to the following order: small from 6 to 7 cm, medium from 7.1 to 8 cm, and large, greater than 8.1 cm. Production was related to the length of the harvest period; accession P32 produced 28.545 t ha⁻¹ in a three month period; in contrast, accession P107 obtained 23.685 t ha⁻¹ in a four month period. In the second trial, the harvest began 83 days after transplantation; it lasted for 4.5 months and produced 29.1 t ha⁻¹. In the third trial, harvesting began 90 days after transplanting and reported 21.1 t ha⁻¹ (Table 2).

Table 2. Production of fresh fruit of the Dzonot sweet pepper variety on three sowing dates in a greenhouse.

Transplantation date	Transplantation to harvest (days)	Harvest (month)	Yield (t ha ⁻¹)	Small fruits (%)	Medium fruits (%)	Large fruits (%)
October 4 2019	70	5	40.8 a	30.1	32.3	37.6
July 27 2021	83	4.5	29.1 b	45.1	35.1	19.8

Transplantation date	Transplantation to harvest (days)	Harvest (month)	Yield (t ha ⁻¹)	Small fruits (%)	Medium fruits (%)	Large fruits (%)
January 4 2022	90	3	21.1 b	54.5	30.6	14.9

The yields obtained are high according to those reported by SIAP (2021) of 11.6 t ha⁻¹ in the open field and 20 t ha⁻¹ in the greenhouse, and the report of 28 t ha⁻¹ of lamuyo pepper in the greenhouse (Quesada, 2015).

Conclusions

Dzonot is a variety of landrace sweet pepper that has high yield potential for Yucatán and produces fruits that are homogeneous in shape and in stable manner. Its main characteristic compared to other materials is the flat shape of the fruit, wider than long, and deep interlocular grooves

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